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Aid to the Services Sector

Does It Affect Manufacturing Exports?

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Abstract

This paper evaluates the impact of foreign aid to five service sectors (transportation, information and communications technologies, energy, banking/financial services, and business services) on exports of downstream manufacturing sectors in developing countries. To address the reverse causality between aid and exports, the analysis relies on an original identification strategy that exploits (i) the variation of aid flows to service sectors, and (ii) the variation of service-intensities across industrial sectors and countries using input-output data. The authors find a positive effect of aid to services, in general, on downstream manufacturing exports of developing countries across regions and income-level groups.

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Aid to the Services Sector: Does It Affect Manufacturing Exports?‡

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1. Introduction

The global recession has placed aid budgets of donor countries under significant strains. In addition, aid effectiveness as it relates to trade is at the forefront of development policy discussions. There is also increased attention to project planning and focusing aid for trade in areas of maximum impact and return on investment. Moreover, there is very limited empirical evidence on the impact of aid to service sectors. Aid for trade has rapidly gained importance in trade and development circles as well as in the donor community. Launched at the Hong Kong SAR, China WTO Ministerial Conference in December 2005, the aid for trade initiative aims at helping developing countries, particularly least developed countries, overcome their supply-side constraints, so as to expand trade and benefit from global integration. Despite enjoying preferential market access and facing lower tariffs, several developing countries —especially low-income countries— have seen their share of world exports diminish over the past years. Clearly, the reduction of tariff and non-tariff barriers faced by developing countries is an essential condition for their export growth, but not a sufficient one. These countries face supply-side constraints that severely limit their ability to reap the benefits from global trade integration.

Evidence on the effectiveness of aid for trade in improving trade-related performance in developing countries is still limited. An important limitation prevalent in any econometric assessment is the potential reverse causality between aid and trade. Indeed, aid for trade is expected to have an impact on exports, however, aid may also be determined by export performance. If, for instance, better performing countries are rewarded with more aid, estimates of aid for trade coefficients would be biased upward.

In this paper, we propose an identification strategy that helps to overcome the reverse causality of the trade-aid relationship. Using input-output data, we exploit the differential

service-intensities of manufacturing sectors to evaluate the impact of aid in five service sectors (transport, communications, energy, banking/financial services, and business services) on exports of downstream manufacturing sectors for 132 countries between 2002 and 2008.

Our estimates, in general, show a positive effect of aid to services on downstream manufacturing exports of developing countries. Aid to transport, energy, and banking sectors have consistently a significant and positive impact on downstream manufacturing exports. The effectiveness of aid to transportation in terms of exports growth diminishes for country groups with higher income, whereas the effectiveness of aid to energy and business services increases with the income of the group.

The rest of the paper is organized as follows. Section 2 provides a literature review on aid and aid for trade. Section 3 explains our identification strategy. Section 4 describes the data and data resources used in our empirical analysis. Section 5 presents our results. Finally, the last section concludes and discusses potential avenues for further research.

2. Literature Review

Our review is divided in two parts. We start with a brief account of the large literature on aid and growth, where the reverse-causality of aid-growth is prevalent. The second part defines briefly aid for trade and reviews the literature that is more specific to it.

2.1. Aid and Growth

The literature on the impact of aid on the level of development of recipient countries is very large and keeps growing, and we provide a small and selective review in this paper.

Unfortunately, the results of the studies have been mixed.[1] There is no robust evidence of either a positive or negative correlation between foreign aid inflows and the economic growth of poor countries.

Most studies that find a positive effect between aid and growth also find this holds only under specific conditions such as quality of institutions, geographic location, and social elites of a country whereas other studies find that the type and timing of aid is what matters most.[2] On the other hand, Rajan and Subramanian (2011) argue that the costs emanating from foreign aid offset its benefits. The authors find that aid has a Dutch disease effect on the terms of trade of recipient countries resulting in a negative impact on traded goods and on growth.[3]

The existing literature also stresses the reverse causality between aid and growth that could lead to misleading results. A few studies attempt to address this problem using instrumental variables. Rajan and Subramanian (2008) estimate a bilateral aid specification including variables traditionally used in the gravity model of bilateral trade (i.e., common language, colony relationships, among others) to generate a fitted aid measure (first stage) that is used as an instrument for aid in a GDP growth equation (second stage). They find little robust evidence of a positive (or negative) relationship between aid and GDP growth. On the other hand, Bruckner (2011) adopts a different two-stage strategy. In the first stage, he estimates an equation explaining aid using rainfall, commodity price shocks, GDP growth, and other controls. In the second stage, the fitted residuals are used as instruments for aid in a per capita GDP

[1] See for example: Burnside and Dollar (2000); Collier and Dollar (2002); Easterly (2003); Easterly, Levine, and Roodman (2003); Clemens, Radelet, and Bhavnani (2005); Bourguignon and Sundberg (2007); Rajan and Subramanian (2008).
[2] See: Burnside and Dollar (2000); Dalgaard et al. (2004); Angeles and Neanidis (2009); Clemens et al. (2004).
[3] Some other studies of aid and exchange rates include: Younger (1992); Arellano et al. (2005); Berg et al. (2005); Prati and Tressel (2006).

growth specification. Bruckner finds that aid has a significant and positive effect on real per capita GDP growth.

Finally, Bourguignon and Sundberg (2007) point to the wide heterogeneity of aid motives and the limitations of the tools of analysis. They suggest that the complex causality chain linking external aid to final outcomes has been handled mostly as a kind of "black box", and progress on estimating rigorously aid effectiveness requires opening that box.

2.2. Aid for Trade

According to the WTO, Aid for Trade aims to help developing countries, particularly least-developed countries, build-up the trade-related skills and infrastructure that are needed to implement and benefit from WTO agreements and to expand their trade.[4] Aid for trade is an integral part of regular official development assistance (ODA). Donors have, in fact, been providing substantial amounts of aid to trade-related programs for many years. Moreover, the scope of aid for trade has expanded considerably. During the 1986-1994 Uruguay Round of trade negotiations, trade related assistance was mainly aimed at technical support to help developing countries negotiate and implement trade agreements. Subsequently, the scope expanded to include building supply-side capacities, for instance in private sector development and trade-related infrastructure. Now the agenda also includes trade-related structural adjustment programs and other trade-related needs.

Aid for trade, as defined by the OECD, has nearly tripled between 2001 and 2008 as shown in Figure 1. Yet, as Figure 2 displays, the share of total aid that targets trade related projects has substantially decreased over the years only to marginally increase after 2006. Since

[4] http://www.wto.org/english/tratop_e/devel_e/a4t_e/aid4trade_e.htm

2006 there has been an important surge in aid for trade in both absolute and relative terms; however, evidence of its effectiveness is still scant.

A limited number of studies focus on the impact of aid for trade.[5] Brenton and Uexkull (2009) analyze the effectiveness of export development programs. Using a difference in difference approach, they aim at isolating the impact of the policy interventions and draw four main conclusions. First, most export development programs have coincided with or predated stronger export performance. Second, such programs appear to be more effective where there is already significant export activity. Third, there is some concern about the "additionality" of the programs as support may be channeled to sectors that would have prospered anyway. Finally, conclusions strongly depend on what one postulates would have happened in the absence of the policy intervention, so the definition of a credible counterfactual is of utmost importance for the evaluation of technical assistance for exports.

Helble, Mann, and Wilson (2009) make one of the first attempts to analyze how foreign aid spent on trade facilitation increases trade flows in developing countries. The authors use a gravity model of bilateral trade and find that the bulk of the relationship between aid and trade appears to come from a narrow set of aid flows directed toward trade policy and regulatory reform, rather than broader aid-for-trade categories directed toward sectoral trade development or infrastructure development. Other studies on the effect of aid on trade have found similar positive results to those found by Helble, Mann, and Wilson (2009), including Cali and te Velde (2010), the latter being the closest study to our own.

Indeed, Cali and te Velde (2010) evaluate whether aid for trade has improved export performance. They find that aid for trade facilitation, and to some extent aid for trade policy and

[5] For and extended review of the literature on the relationship of aid and trade, see Suwa-Eisenmann and Verdier (2007).

regulations, helps reduce the cost of trading (both in terms of exports and imports). In addition, their results suggest that aid to economic infrastructure increases exports, whereas aid to productive capacity appears to have no significant impact on exports. The authors correctly point out that aid for trade is possibly endogenous to exports; particularly aid to productive capacity. For instance, if better performing sectors tend to receive more aid for trade than other sectors, it would generate an upward bias in the aid coefficient. To address this endogeneity, the authors instrument aid for trade with the degree of respect for civil and political liberties measured by the Freedom House Index and with an index proposed by Gartzke (2009) that measures the "affinity of nations"[6]. The authors argue that many donors choose recipients based upon development and democratic measures like these which make these indicators correlated with aid but not with exports. However, the authors acknowledge that their instruments are not appropriate for sectoral analysis, as they only vary across country-year and not across country-sector-year.

We propose an alternative identification strategy that allows us to analyze the impact of sectoral aid. To address reverse causality, we exploit the links between the service sector and the manufacturing sector relying on input-output tables. Although input-output data has not been used in the analysis of aid effectiveness so far, a number of studies, particularly in the FDI literature, make use of it. Given the difficulty of finding consistent input-output matrices across countries most studies rely on input-output data from the United States to describe the technological possibilities of firms in a given economy. Acemoglu, Johnson, and Mitton (2009) investigate how contracting costs and financial development determine the extent of vertical integration across countries. Alfaro and Charlton (2009) use new firm level data at the 4-digit sector level and U.S. input-output tables to classify firms between horizontal and vertical

[6] In preliminary research we also attempted to use other instrumental variables for aid for trade such as immunization rates, gender health access. However, statistical tests suggested that they are not appropriate instruments for aggregate aid for trade.

subsidiaries. The authors find that at the two-digit industry level, there are considerably more horizontal (subsidiaries in the same industry as their parents) than vertical (subsidiaries that supply their parents with inputs) FDI. However, disaggregating to the four-digit level reveals that many of the foreign subsidiaries in the same two-digit industry as their parents are, in fact, located in sectors that produce highly specialized inputs to their parents' production. Thus, contrary to the conventional wisdom, the authors find that the number of vertical multinational subsidiaries is larger than commonly thought.

Among the few studies using input-output data for countries other than the U.S, Hummels, Ishii, and Yi (2001) define a measure of vertical specialization that captures a country's role in the fragmentation of production into multiple stages in multiple locations. The authors use input-output tables from ten OECD nations and four other countries to measure a country's vertical specialization as its exports weighted by the share of imported inputs in its total output. Trefler and Zhu (2010) use 20 input-output tables from the Global Trade Analysis Project (GTAP) to reassess Vanek's (1968) factor content of trade predictions in 41 countries.

3. Tackling Reverse Causality: An Identification Strategy

Aid flows are expected to have an impact on exports, but a country's exports may also affect the aid the country receives. It is plausible that donors target industries in recipient countries where exports are expanding or declining. As mentioned above, Brenton and Uexkull (2009) find that exports have increased owing to the effect of donor-funded export development programs in a number of countries. However, although the programs have preceded stronger export performance, causality cannot be clearly determined. Factors like the initial size of the

export sector, or selection bias (i.e., technical assistance may target products with already promising prospects) appear to be the real reasons behind the targeted commodities.

To address this issue, we propose an original identification strategy. Instead of directly focusing on how aid that targets a specific manufacturing sector impacts its own exports, we analyze how aid that targets service sectors—such as banking, energy, and business services—has an impact on exports of downstream manufacturing using these services. OECD donors report disbursed flows of yearly aid by service sector to each recipient. Table 1 reports total aid disbursed in 2008 into the different categories of aid for trade and displays the link that we use in our identification strategy between service categories and manufacturing sectors.

Our identification strategy could be considered an extension to that used by Rajan and Zingales (1998). The main idea of their work is that industries differ in terms of their dependence from external finance because of industry specific technological reasons. Therefore, when a country's financial system develops those sectors that rely more heavily on external finance will benefit and grow disproportionately faster. In our case we exploit the dependence of manufacturing industries not only on financial services but also on transportation, ICT, energy, and business services. As Rajan and Zingales (1998) we expect those manufacturing industries that use transportation more heavily to benefit the most from aid to transportation services, industries that use energy more intensively to benefit the most from aid to energy services, and so on. If aid has a positive impact it should improve the quality of the services provided and/or reduce the costs to downstream users of these services. Thus, industries that use these services more intensively should be able to produce more (i.e., cheaper inputs) and ultimately export more as well.

To implement our identification strategy, we need both the amount of aid received by each service sector in a country as well as information on how intensively a manufacturing sector uses upstream services sectors. Information on service intensity can be computed from input-output tables which provide information on the inter-industry relations of an economy. We use the total input requirements which are estimates of the inputs—including services—for each industry that are directly and indirectly required to deliver a dollar of the industry output to final users. Thus, exports are determined by:

$$lnX_{ijt} = \alpha_{ij} + \gamma_{it} + \delta_{jt} + \sum_k \beta_k \ln(aid_{ikt} \times k\_intensity_{ij}) + \varepsilon_{ijt} \qquad (1)$$

where: X_{ijt} is exports of sector *j* in country *i* in year *t*; aid_{ikt}, is the amount of aid addressed to the service sector *k* of recipient country *i* in year *t*; $k\_intensity_{ij}$ is the intensity with which the manufacturing sector *j* uses upstream service sector *k* in country *i.* which can be roughly interpreted as the cents of service k used in the making of a dollar of product j. We also include country-sector fixed effects, α_{ij}, to control for invariable characteristics specific to a manufacturing sector in a given country, such as constant taxes and subsidies. Country-year effects, γ_{it}, control for shocks specific to a country in a given year, such as inflation, exchange rates, political or economic shocks, and climate shocks such as natural disasters. Sector-year effects, δ_{jt}, control for shocks specific to a sector worldwide in a given year, such as any supply or demand shock having an impact on world market prices.

4. Data Description

Aid flow data were compiled from the OECD's Creditor Reporting System (CRS); exports, specifically mirrored imports, were taken from UNCTAD's COMTRADE database; output was taken from UNIDO's INDSTAT 4; and input-output tables were compiled from

GTAP7 and Argentina's INDEC. Since each of these sources uses different classification schemes, we first merged all databases together through the concordances described in Table 2, which also describes the five input service sectors and the nine manufacturing sectors used in our analysis. The final sample consists of 132 developing countries over the period 2002-2008.

The OECD CRS database includes detailed information about the donor and recipient country, purpose of the aid disbursed, and the amount disbursed. We use this information to classify data on aid flows targeting each service sector as well as aid directly addressed to each manufacturing sector. Figure 2 illustrates total aid disbursements to service sectors between 2002 and 2008. Our sample only starts in 2002, due to the quality of data on aid disbursements. Indeed, OECD affirms that the annual coverage of the CRS data on disbursed aid is below 60% before 2002, whereas it is over 90% since 2002 and reached nearly 100% starting with 2007 flows.[7]

The key ingredient in our analysis is the link between inputs and outputs across sectors in an economy, as described in the input-output matrix. Extracting balanced input-output tables from the GTAP dataset requires several steps: the essential reference is McDonald and Thierfelder (2004). We first extracted all the social accounting matrix (SAM) components that are part of an input-output table, and then calculate the total input requirements for each sector.[8] Out of the 132 countries in the sample, only 60 have country specific input-output tables in GTAP7; the remaining 72 countries are matched to 18 regions for which regional input-output tables are available.

[7] http://www.oecd.org/document/50/0,3746,en_2649_34447_14987506_1_1_1_1,00.html
[8] Input-output data extracted from the GTAP data set are the result of the GTAP fitting procedure. Original data are not provided in the GTAP data set.

Any change in a service sector will affect *directly* downstream manufactures using it, but also i*ndirectly* through other inputs using this service[9]. We are interested in the total effect that can be defined as the sum of *direct* and *indirect* effects. It can be derived from the total requirement matrix that is computed using a simple multiplier, $(I-A)^{-1}$, where I is the identity matrix and A is a matrix of direct input coefficients. Figure 3 depicts the average service intensities of each manufacturing sector across countries in our sample. Table 3 presents summary statistics for the total input requirement of all five service sectors.

5. Results

This section describing results is divided in three subsections. The first subsection presents the baseline estimates and a number of robustness checks. The second one displays results for sub-samples of countries grouped by income and regional breakdowns. The third one analyzes the impact of aid on total output rather than on exports.

5.1. Baseline Estimates

Table 4 reports estimates of equation (1) using ordinary least squares on a panel covering the period 2002-2008. The baseline estimates in column 1 indicate that a 10 percent increase in aid to transportation, ICT, energy, and banking services is associated a 2 percent, 0.3 percent, 6.8 percent, and 4.7 percent increase of manufacturing exports, respectively. Aid to the business service sector is positive but not statistically significant.

We carry out a number of robustness checks on the baseline estimates to address concerns about data limitations. As mentioned in Section 3, only 60 out of the 132 countries in the sample have country-specific input-output tables in GTAP. To confirm that our results are

[9] For a detailed discussion on input-output analysis see: Miller and Blair (2009).

not driven by the 72 countries sharing 18 regional input-output tables, we estimate the baseline specification on the sample of 60 countries that have country-specific input-output tables; column 2 displays the results. With less than half of the total number of observations, aid to transportation, energy, and banking services maintains the positive significant relation with manufacturing exports whereas aid to ICT and business services is no longer positive; however it is not statistically significant.

A different way to verify the sensitivity of the input-output data in our estimates is to use the same input-output table for all countries. We replace services intensities computed from GTAP input-output tables with intensities obtained from the total input requirement table from Argentina.[10] The estimates are shown in column 3 of Table 4. The main results hold: aid to transportation, energy, and banking services is positively associated with higher levels of manufacturing exports. However, in this case, aid to business services becomes positive and significant whereas the coefficient on aid to ICT services remains statistically insignificant.

As mentioned in the data description, CRS aid disbursements coverage has been improving over time. As a way to check for measurement error in aid disbursement data we estimate the baseline regression using only the last three years of available data. Column 4 of Table 4 displays the results. Aid to all service sectors displays a positive relation with manufacturing exports; however, aid to banking is not statistically significant. Notice that the magnitude of the coefficient on business services increases substantially. This could be due to the concentration of more resources into this type of services in the last few years as shown in Figure 2.

As a final robustness check, we estimate equation (1) using only the sample of countries that have export data for every manufacturing sector and every year. This sample consists of 117

[10] http://www.indec.gov.ar/

countries, omitting 15 mostly smaller island countries such as Palau, Samoa, and Vanuatu. The results are shown in column 5 of Table 4. The main results still hold: aid to the transportation, energy, banking, and business service sectors reveals a positive and significant relation with exports whereas aid to ICT services again is not statistically significant.

5.2. Estimates by Income and Regional Samples

We estimate the differentiated impact of aid effectiveness by region and income level of recipient countries. A priori, aid effectiveness may differ in each region and income group, as each subgroup of countries produce and export a different bundle of goods given their initial endowments, quality of services, and production technology. Attempting to measure the effectiveness aid to services in each region and income group can provide a starting point for the analysis of individual country policy recommendations.

Table 5 displays the results of estimating equation (1) for each income group of countries, as defined by the World Bank.[11] Akin to baseline estimates, aid to transportation, ICT, energy, and banking in low-income countries has a positive and significant effect on manufacturing exports. Only aid to business services records a negative impact on exports in low-income countries. In lower-middle income countries, aid to ICT services is associated with lower levels of manufacturing exports whereas in upper-middle income countries aid to transportation services seems to have a negative impact.

The effect of aid to transportation on exports growth is lower the higher the income of the group of countries. As aid to transportation mainly consists in investments on physical infrastructure, this result is consistent with Portugal-Perez & Wilson's (2010) finding that the

[11] Economies are divided according to 2009 GNI per capita, calculated using the World Bank Atlas method. The groups are: low income, $995 or less; lower middle income, $996 - $3,945; upper middle income, $3,946 - $12,195; and high income, $12,196 or more.

marginal effect of physical infrastructure improvement on exports appears to be decreasing in per capita income. Aid to energy and business services follows the opposite progression across income groups, as their impact on exports increases with the income of the group.

Regarding the progression of aid to banking and business services across income groups, aid to banking has a positive impact in low-income groups and aid to business services has a negative impact. By opposition, the impact of aid to banking services is negative for upper-middle countries, whereas the impact of aid to business services is positive. Lower-middle income countries experience a positive impact of both aid to banking and services. These results suggests that, as upper-middle income countries might be more financially developed, aid to banking services does not have the positive impact it does in low income countries. Furthermore, once firms have access to financial services, other services such as business development and technical advisory seem to become a priority; consequently, aid to business services in middle income countries has a positive effect on manufacturing exports.

Estimates on sub-samples of countries by regions, presented in Table 6, also confirm these results. For example, for the regions with the highest percentage of upper-middle income countries—Latin America and the Caribbean (LAC) and for Middle East and North Africa (MNA)—aid to business services is positively associated with higher manufacturing exports whereas aid to banking services displays a negative relation with manufacturing exports. On the other hand, in South Asia where there are only low income and lower-middle income countries, aid to banking is positively associated with manufacturing exports whereas aid to business services is negatively associated.

5.3. Aid and Output

If aid has a positive impact it should improve the quality of the services provided and/or reduce the costs to downstream users of these services. Thus, industries that use these services more intensively should be able to produce more (i.e., cheaper inputs) and ultimately export more as well. We use the same methodology described in Section 3 to confront this idea with actual output data. Table 7 shows the results for a selected number of countries that have output data available. The dependent variable in column 1 is the natural logarithm of individual industry output whereas the dependent variable in column 2 is, as in previous results, the natural logarithm of exports for each industry. We can see that the effect of aid to services is very similar for manufacturing output as it is for exports except that the effect, in absolute terms, is slightly greater for output. These results make sense as any improvement in services will benefit all firms—exporting and non-exporting—thus the effect of aid is slightly greater for output than for exports.

5. Conclusions

Assessing the effectiveness of trade-related projects is a challenging task. Rigorous methods of impact evaluation used more extensively in education, cash transfers, and health programs, are less easily implementable in trade projects. In the absence of micro-level impact evaluation, macro-level evaluations can provide a general assessment on whether aid has had the expected impact on a specific variable. Certainly, macro-level exercises are not free from data and limitations and the presence of endogeneity, and results have to be taken carefully for policy recommendations.

We propose an original identification strategy to measure the impact of aid on exports exploiting the input-output linkages in an economy to analyze how aid to service sectors affects manufacturing exports. We believe that our estimating strategy is econometrically sound and the results suggest areas for further exploration, as it relates to discussions on aid for trade. A similar analysis can be extended to estimate the spillover effects of aid on different input sectors on downstream exports.

We find that aid to the transportation and energy sectors is the most effective when the objective is to increase the exports of a recipient country. These results are robust to a number of different specifications. The effectiveness of aid to transportation in terms of export growth diminishes for country groups with higher income, whereas the effectiveness of aid to energy and business services increases with the income of the group.

Finally, we believe that the results presented can help inform future research and policy discussions on an area of aid for trade largely unexplored, the link between aid and the services sector. A more detailed analysis involving rigorous impact evaluation of specific projects covering costs and benefits for a developing country can provide guidance on how to increase aid efficiency.

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TABLES AND FIGURES

Figure 1 – Aid for Trade (USD millions)

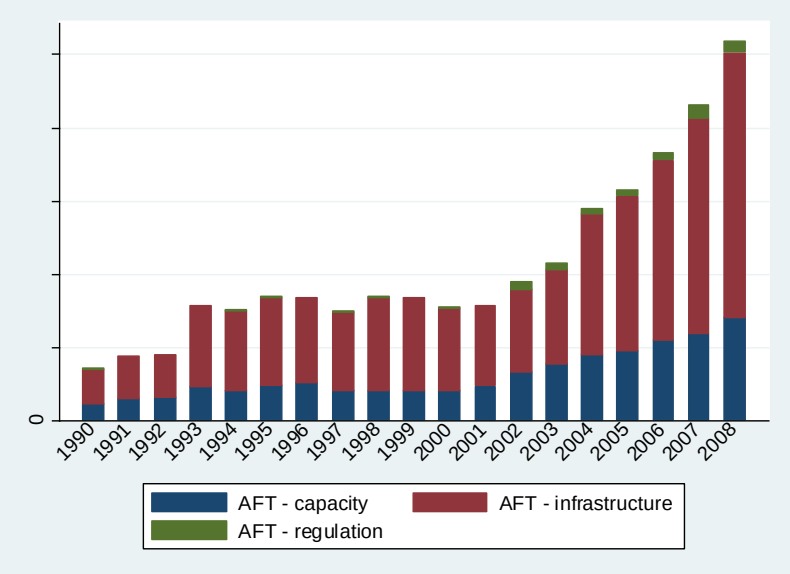

Figure 2 –Total AFT vs. Share of AFT in Total Aid

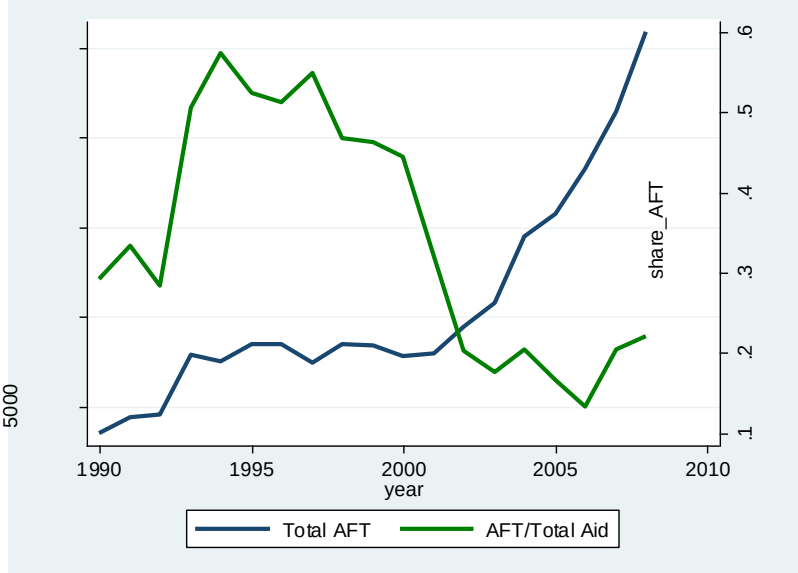

Figure 3 – Aid to Service Sectors (USD millions)

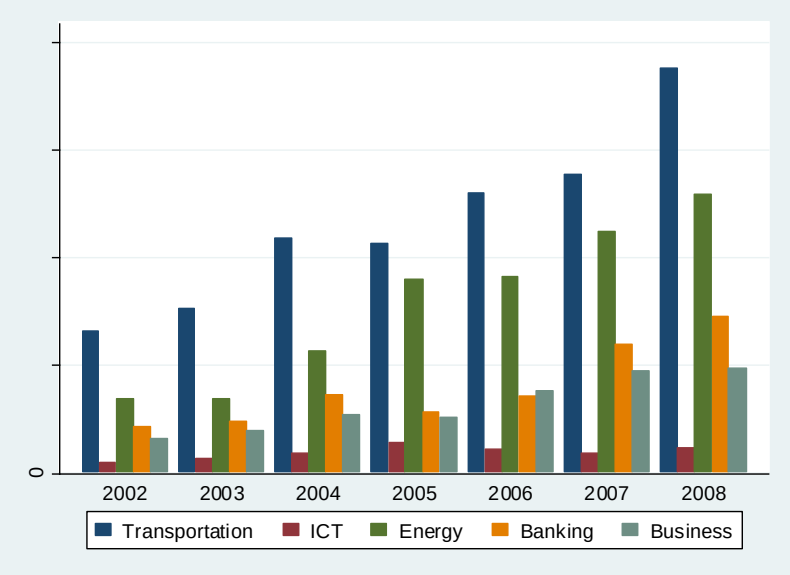

Figure 4 – Average Service Intensity by Manufacturing Sector

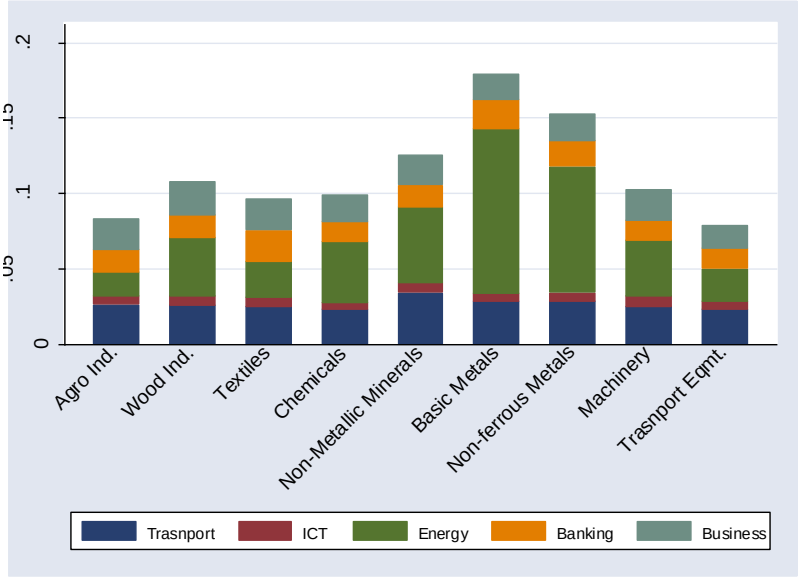

Table 1 – Total 2008 AFT by categories

code/ sector name	2008 Disbursements (USD millions)	2008 Disbursements (%)
Infrastructure	**13,112**	**51%**
210 Transport & Storage	7,494	29%
220 Communications	461	2%
230 Energy	5,157	20%
Production Capacity	**11,741**	**45%**
240 Banking & Financial Services	2,892	11%
250 Business & Other Services	1,943	8%
311 Agriculture	4,668	18%
312 Forestry	534	2%
313 Fishing	341	1%
321 Manufacturing	1,362	5%
Agro-industries	*104.5*	*0.40%*
Wood industries	*3.9*	*0.01%*
Textiles	*10.3*	*0.04%*
Chemicals	*119.5*	*0.46%*
Non metallic products	*0.8*	*0.00%*
Basic Metals	*11.4*	*0.04%*
Non-ferrous metals	*0.3*	*0.00%*
Machinery	*41.8*	*0.16%*
Transport equipment	*21.1*	*0.08%*
Energy manufacturing	*1.4*	*0.01%*
Ind. policy, development, R&D	*1,047*	*4.04%*
322 Mineral Resources & Mining	241	1%
Trade Policies and Regulations	**795**	**3%**
Total	**25,888**	**100%**

Table 2 - Databases' Concordances					
Sector	**Industry**	**CRS (aid) purpose code**	**COMTRADE (exports) SITC**	**INDSTAT (output) ISIC Rev. 3**	**GTAP (input-output) GTAP AGG**
agriculture	agriculture	311	11		pdr, wht, gro, v_f, osd, c_b, pfb, ocr, ctl, oap, rmk, wol
forestry	forestry	312	12		frs
fishing	fishing	313	13		fsh
mining	mining	322	21, 22, 23, 29		coa, oil, gas, omn
construction	construction	323			cns
manufacturing					
	agro-industries	32161	31	15, 16	cmt, omt, vol, mil, pcr, sgr, ofd, b_t
	forest industries	32162	33, 34	20, 21, 22	lum, ppp
	textile	32163	32	17, 18, 19	tex, wap, lea
	chemicals	32164, 32165, 32168	35	23, 24, 25	p_c, crp
	non-metallic mineral	32166	36	26	nmm
	basic metal	32169	371	271	i_s
	non-ferrous metal	32170	372	272	nfm
	engineering	32171	382, 383, 385	29,30,31,32,33	ele, ome
	transport equipment	32172	384	34, 35	mvh, otn
	other manufacturing	Other under sector 321	381, 39	28, 36, 37, 273	fmp, omf
services					
	transportation	210			otp, wtp, atp
	ICT	220			cmn
	energy	230			ely, gdt, wtr
	banking	240			ofi, isr
	business	250			obs
	other inputs				trd, ros, osg, dwe

Table 3 – Summary Statistics					
Variable	Obs.	Mean	Std. Dev.	Min	Max
ln_trade0	8243	16.768	3.388	3.714	27.253
ln_intaid_trans	8243	10.234	4.970	-10.353	17.892
ln_intaid_ict	8243	6.182	4.386	-9.370	13.375
ln_intaid_energy	8243	8.784	6.037	-7.796	18.750
ln_intaid_bank	8243	6.950	5.960	-11.926	16.513
ln_intaid_bus	8243	7.742	5.252	-6.755	15.222
Transport int.	8243	0.026	0.019	0.00003	0.196
ICT int.	8243	0.006	0.004	0.00001	0.042
Energy int.	8243	0.048	0.059	0.00000	0.404
Financial int.	8243	0.015	0.012	0.00001	0.086
Business int.	8243	0.018	0.015	0.00002	0.086
Transport disb.	8243	33.900	77.885	0	813.754
ICT disb.	8243	1.871	5.283	0	73.600
Energy disb.	8243	17.570	45.730	0	446.367
Financial disb.	8243	8.910	27.555	0	309.197
Business disb.	8243	6.525	24.402	0	477.660
Source: Own calculations for baseline sample.					

Table 4 – Baseline Estimations					
	(1) Baseline	(2) I-O only	(3) ARG I-O	(4) 06-08	(5) Complete
Transportation	0.196***	0.493***	0.175***	0.311***	0.187***
	[0.017]	[0.028]	[0.017]	[0.023]	[0.016]
ICT	0.033*	-0.011	-0.02	0.401***	-0.021
	[0.017]	[0.013]	[0.017]	[0.030]	[0.016]
Energy	0.684***	0.442***	0.612***	0.035*	0.651***
	[0.020]	[0.017]	[0.018]	[0.018]	[0.018]
Banking	0.468***	0.467***	0.541***	0.036	0.576***
	[0.026]	[0.024]	[0.020]	[0.044]	[0.020]
Business	0.007	-0.018	0.030***	0.405***	0.031***
	[0.014]	[0.020]	[0.011]	[0.045]	[0.011]
Observations	8243	3339	8243	3552	7371
R-squared	0.99	0.99	0.99	0.99	0.99

Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is ln(exports). All regressions control for country-sector, country-year, and sector-year effects.

Table 5– Estimates by Income Groups			
	(1) LOW	(2) MIDLW	(3) MIDUP
Transportation	0.763***	0.696***	-0.355***
	[0.038]	[0.039]	[0.035]
ICT	0.061***	-0.395***	1.035***
	[0.020]	[0.032]	[0.053]
Energy	0.142***	0.283***	1.092***
	[0.018]	[0.025]	[0.027]
Banking	0.222***	0.309***	-1.460***
	[0.040]	[0.024]	[0.025]
Business	-0.189***	0.346***	1.443***
	[0.020]	[0.030]	[0.043]
Observations	3265	3195	1783
R-squared	0.99	0.99	0.99

Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is ln(exports). All regressions control for country-sector, country-year, and sector-year effects.

Table 6 – Estimates by Geographic Regions						
	(1)	(2)	(3)	(4)	(5)	(6)
	EAP	ECA	LAC	MNA	SAS	SSA
Transportation	0.576***	1.420***	1.020***	0.846***	0.802***	0.025
	[0.050]	[0.022]	[0.015]	[0.026]	[0.050]	[0.045]
ICT	-0.283***	-0.007	0.457***	0.324***	0.118***	0.483***
	[0.056]	[0.032]	[0.017]	[0.041]	[0.022]	[0.031]
Energy	0.437***	-0.074*	-1.276***	0.177***	0.153***	0.637***
	[0.032]	[0.041]	[0.013]	[0.009]	[0.048]	[0.031]
Banking	0.388***	0.060***	-0.364***	-0.272***	0.137**	0.223***
	[0.053]	[0.019]	[0.015]	[0.020]	[0.054]	[0.047]
Business	0.412***	0.001	1.663***	1.030***	-0.146***	0.090*
	[0.031]	[0.029]	[0.015]	[0.016]	[0.020]	[0.047]
Observations	1237	972	1827	756	504	2947
R-squared	0.99	0.99	0.99	0.99	0.99	0.99

Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is ln(exports). All regressions control for country-sector, country-year, and sector-year effects. Regional abbreviations are as follows: East Asia Pacific (EAP); East Europe and Central Asia (ECA); Latin America and the Caribbean (LAC); Middle East and North Africa (MNA); South Asia (SAS); and South Saharan Africa (SSA).

Table 7 – Output vs. Exports		
	(1)	(2)
	output	exports
Transportation	0.389***	0.323***
	[0.007]	[0.015]
ICT	-0.369***	-0.324***
	[0.005]	[0.015]
Energy	0.079***	0.064***
	[0.003]	[0.006]
Banking	0.384***	0.342***
	[0.004]	[0.008]
Business	0.327***	0.307***
	[0.008]	[0.016]
Observations	2070	2069
R-squared	0.99	0.99

Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable in column 1 is ln(ouput) in column 2 is ln(exports). All regressions control for country-sector, country-year, and sector-year effects.

Appendix. List of countries

Afghanistan	Eritrea	Mongolia	Turkey
Albania	Ethiopia(excludes Eritrea)	Montenegro	Turkmenistan
Algeria	Fiji	Morocco	Uganda
Angola	Gabon	Mozambique	Ukraine
Argentina	Gambia, The	Namibia	Uruguay
Armenia	Georgia	Nepal	Uzbekistan
Azerbaijan	Ghana	Nicaragua	Vanuatu
Bangladesh	Grenada	Niger	Venezuela
Belarus	Guatemala	Nigeria	Vietnam
Belize	Guinea	Oman	Yemen
Benin	Guinea-Bissau	Pakistan	Zambia
Bhutan	Guyana	Palau	Zimbabwe
Bolivia	Haiti	Panama	
Botswana	Honduras	Papua New Guinea	
Brazil	India	Paraguay	
Burkina Faso	Indonesia	Peru	
Burundi	Iran, Islamic Rep.	Philippines	
Cambodia	Jamaica	Rwanda	
Cameroon	Jordan	Samoa	
Cape Verde	Kazakhstan	Sao Tome and Principe	
Central African Rep.	Kenya	Senegal	
Chad	Kiribati	Seychelles	
Chile	Korea, Dem. Rep.	Sierra Leone	
China	Kyrgyz Republic	Solomon Islands	
Colombia	Lao PDR	Somalia	
Comoros	Lebanon	South Africa	
Congo, Dem. Rep.	Lesotho	Sri Lanka	
Congo, Rep.	Liberia	St. Kitts and Nevis	
Costa Rica	Libya	St. Lucia	
Cote d'Ivoire	Macedonia, FYR	St. Vincent Grenadines	
Croatia	Madagascar	Sudan	
Cuba	Malawi	Suriname	
Djibouti	Malaysia	Swaziland	
Dominica	Maldives	Syrian Arab Rep.	
Dominican Rep.	Mali	Tajikistan	
East Timor	Mauritania	Tanzania	
Ecuador	Mauritius	Thailand	
Egypt, Arab Rep.	Mexico	Togo	
El Salvador	Micronesia, Fed. Sts.	Tonga	
Equatorial Guinea	Moldova	Tunisia	